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Can 12-step Group participation strengthen and extend the benefits of adolescent addiction treatment? A prospective analysis

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Abstract

Background—Despite advances in the development of treatments for adolescents with substance use disorders (SUD), relapse remains common following an index treatment episode. Community continuing care resources, such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA), have been shown to be helpful and cost-effective recovery resources among adults. However, little is known about the clinical utility and effectiveness of AA/NA for adolescents, despite widespread treatment referrals.

Method—Adolescents ($N = 127$; 24% female, 87% White, M age = 16.7 years) enrolled in a naturalistic, prospective study of community outpatient treatment were assessed at intake, and 3- and 6-months later using a battery of standardized and validated measures.

Results—Just over one-quarter of youth attended AA/NA meetings during the first 3-months, which was predicted by a goal of abstinence, prior AA/NA attendance, and prior SUD treatment experiences. Controlled multiple regression analyses revealed an independent effect of AA/NA on abstinence, in both contemporaneous and lagged models, which persisted over and above the effects of pre-treatment AA/NA attendance, prior treatment, self-efficacy, abstinence goal, and concomitant outpatient treatment.

Conclusions—Results suggest that, similar to findings comparing adult outpatients to inpatients, AA/NA participation is less common among less severe adolescent outpatients. Nonetheless, attendance appears to strengthen and extend the benefits of typical community outpatient treatment. Given the dramatic increase in rates of substance use among same-aged peers in the population at this life-stage, and the relative dearth of abstainers and recovery-specific supports, these resources may provide a concentrated cost-effective social recovery resource for young people.

Keywords

Alcoholics Anonymous; Narcotics Anonymous; self-help; groups; adolescent

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1. Introduction

Alcohol and other drug use disorders among youth present a tenacious public health problem. Despite considerable advances in the development of efficacious treatments for adolescents with these disorders, relapse is very common following an index episode of care (Dennis et al., 2004). Some form of ongoing recovery support is recommended, but among youth exhibiting a broad range of substance-related involvement and impairment, only about one-third who received treatment in either inpatient or outpatient settings engage in any kind of continuing care (Godley et al., 2001; Godley et al., 2007).

Widely available community groups, such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA), have the potential to be promising relapse prevention resources for young people, as they are often accessible in patients' own communities free of charge, and can be attended at times when relapse risk is typically high and when professional resources are often unavailable (e.g., evenings and weekends). Additionally, these organizations have been shown to be helpful and cost-effective relapse prevention and recovery resources for many different types of adult patients with substance use disorders (SUD; Kelly and Yeterian, 2008; Humphreys and Moos, 2001; 2007). However, less is known about youth participation in these groups and whether participation confers similar benefits to adolescents.

1.1 Developmental Barriers to 12-step Mutual-Help Group Participation

Despite the promising aspects of 12-step mutual-help groups (MHGs), young people may face barriers to AA/NA participation related to their developmental status. For instance, in AA, only 2% of members are under 21 years old, and only 11% are under age 30 (Alcoholics Anonymous, 2008). Similarly, among NA members, only 2% are under age 20, and 16% are under age 30 (Narcotics Anonymous, 2008). The lack of age similarity may mean adolescents, who typically have less severe drug use profiles, consequences, and psychosocial concerns, might find it difficult to relate to older members discussing severe withdrawal complications and recovery-related psychosocial challenges surrounding marriage, children, and employment (Kelly et al., 2008c; Kelly et al., 2005). Indirect support for this age-specific barrier comes from prior research with inpatient samples, which found that adolescents who attended 12-step meetings where at least some other young people were also present attended more often, got more involved, and had better post-treatment substance use outcomes when compared to youth attending adult-only meetings (Kelly et al., 2005). In large metropolitan areas, specifically designated "Young People's" AA and NA meetings are available to varying degrees (www.aa.org; www.na.org), but it is unclear the extent to which targeted treatment referrals are made to such groups.

1.2 Adolescent Treatment and 12-step MHG Referrals

In general, referral to AA/NA groups following adolescent SUD treatment, appears to be the norm, irrespective of the theoretical orientation of the program in which young people receive treatment. For instance, a national study of adolescent-specific treatment facilities conducted by Knudsen and colleagues (2008) found that while only 7% of programs based their treatment solely on a 12-step model, nearly half of programs required AA/NA participation during treatment and 84% of programs reported linking youth to community AA/NA groups at discharge. Uniformly high referral rates were also reported by Kelly, Yeterian, and Myers (2008) across five adolescent-specific SUD treatment programs that varied in theoretical orientation. However, despite this apparently widespread referral to AA/NA among adolescent SUD treatment providers, considerably less is known about the appropriateness and clinical utility of such referrals for young people.

1.3. Evidence Regarding Youth AA/NA Participation and Changes in Substance Use

Among adults treated for SUD, there has been a burgeoning of research on AA/NA participation in the past 15 years, which has been summarized in numerous meta-analyses and reviews (Emrick et al., 1993; Ferri et al., 2006; Humphreys, 2004; Kaskutas, 2009; Kelly and Yeterian, 2008; Kelly et al., 2009; White, 2008). However, only limited evidence exists regarding adolescent participation. What is known is based almost exclusively on more severe samples treated in 12-step oriented inpatient programs (Kelly and Myers, 2007). This limited evidence shows high post-treatment rates of AA/NA participation among inpatient youth and positive benefits for those who attend. For example, in an 8-year prospective study of inpatient youth using a rigorous lagged, controlled, statistical analysis, AA/NA participation early following treatment was very common and was associated with significantly better long-term outcomes during the high-risk transition to young adulthood. Additionally, on average over the 8-year follow-up, for each AA or NA meeting attended, youth subsequently gained two days of abstinence, over and above all other factors associated with better outcomes (Kelly et al., 2008a). Other investigations with inpatient samples have shown similar salutary associations (Alford et al., 1991; Hsieh et al., 1998; Kennedy and Minami, 1993; Kelly et al., 2000; 2002). A recent study examined the influence of AA/NA participation among outpatient youth with SUD ($N = 357$; 34% female; M age = 16) found that 26% of youth had attended 10 or more AA/NA meetings in the prior 6 months at a 1-year follow-up and 19% had attended at least one meeting in the prior 6 months at a 3-year follow-up, and that participation was strongly associated with abstinence (Chi et al., 2007). Unlike the inpatient studies mentioned above, in which 12-step concepts were incorporated into the professional treatment, the treatment content in the outpatient sample was eclectic, rather than 12-step. However, AA/NA attendance was “expected” (Chi et al., 2007), which raises the question of how the degree of emphasis placed on 12-step group philosophy and participation during treatment influences post-treatment attendance.

1.4. Predictors of Adolescent 12-step MHG Participation

In addition to understanding whether 12-step attendance is helpful for adolescents with SUD, we also need to understand what factors discourage, and what factors promote, participation in order to inform and enhance professional 12-step MHG engagement strategies. Predictors of 12-step MHG participation cut across multiple levels, and can be contextual as well as individual in nature. One of the strongest contextual predictors of AA/NA attendance, alluded to above, is professionally-delivered 12-step education and encouragement to attend AA/NA (Kelly and Yeterian, in press), which is often referred to as “Twelve-Step Facilitation” (TSF). Studies with adults that have systematically employed TSF techniques have proven more effective at increasing attendance than treatment as usual, which, in turn, leads to better substance-related outcomes (Litt et al., 2009; Kaskutas, 2009; Tonigan et al., 2003; Timko and DeBenedetti, 2007; Kaskutas et al., 2009; Wallitzer et al., 2009). Consequently, as a proxy for this, one of the predictors we investigate in this study is the extent to which adolescents report that they were encouraged to attend AA/NA by treatment staff.

A further contextual predictor of AA/NA attendance specific to adolescents is the extent to which their parents view AA/NA groups as important and helpful to their child’s recovery efforts. This is because parents often hold the key to allowing or disallowing attendance and often provide transportation to and from meetings (Kelly, 2001). As such, a less favorable parental attitude toward AA/NA may create an insurmountable barrier for adolescents, even if adolescents themselves are highly motivated to attend such groups. In the present study, we also examine parental attitudes about AA/NA in relation to adolescents’ attendance.

Influential predictors of attendance also can be intra-individual, such as patients’ expectancies about the nature and anticipated benefits of AA/NA attendance (Kahler et al., 2006). Also,

several variables related to the construct of perceived problem severity (Finney and Moos, 1995) stemming from the Health Beliefs Model (HBM; Conner and Norman, 1996; Rosenstock, 1974) could be important. For instance, the degree of substance use involvement and severity, whether patients perceive they have a problem with alcohol/drugs, and whether they report a treatment goal of complete abstinence (vs. continued or reduced use) all should predict greater help-seeking and 12-step attendance. We examine such predictors in this study.

1.5. Study Aims

The current study examines participation in AA/NA among a sample of adolescents receiving outpatient SUD treatment in a setting highly representative of available U.S. community adolescent treatment, in terms of patients' demographic and clinical profile, the program's theoretical orientation, the intensity and duration of service delivery, staffing composition, and degree of linkage to 12-step community resources (Knudsen et al., 2008). We examine a number of contextual- and individual-level predictors of AA and NA participation. We also examine rates of attendance and their concurrent and subsequent (i.e., lagged) relationship to substance use outcome at 3 and 6 months following treatment initiation. It is hypothesized that those most likely to attend will be patients with (a) a greater degree of substance involvement and impairment, (b) an abstinence goal, (c) more positive 12-step expectancies, and (d) lower abstinence self-efficacy, as well as (e) those who are encouraged to attend by clinic staff and whose parents hold favorable attitudes toward 12-step groups. Furthermore, we hypothesize that greater 12-step attendance will be significantly and independently associated with better substance use outcomes.

2. Method

2.1 Participants

Participants were 127 adolescents who presented for treatment at an outpatient SUD treatment facility in the Northeastern U.S. between August, 2006 and May, 2009. Individuals were eligible if they (a) were within their first month of treatment at this facility, (b) were between the ages of 14 and 19 at the time of study entry, (c) had a parent/guardian consent to participation (if under 18), and (d) were English-speaking. Exclusion criteria were (a) active psychosis or (b) having an organic brain/cognitive disorder affecting comprehension of the study and its risks and benefits.

Of the 178 adolescent patients who presented for treatment at the facility during the study enrollment period, 160 (90%) were eligible to participate in the study. Of the eligible patients, 95% ($n = 152$) agreed to be contacted by study staff and 127 (79.4%) enrolled in the study. Of those who did not enroll in the study ($n = 25$), reasons for non-participation included (a) study staff unable to contact patient within their first month of treatment (24%), (b) patient unable/unwilling to schedule an appointment within the first month of treatment (24%), (c) patient did not attend treatment and chose not to participate in the study as a result (24%), (d) parent declining to give consent for their minor child (20%), (e) patient directly declining participation (4%), and (f) transportation difficulties (4%). Females were proportionately less likely to enroll in the study than males; 40% of those who declined participation were female, but females comprised only one-quarter of eligible patients.

Of the 127 adolescents enrolled in the study, 91% completed the 3-month follow-up and 90% completed the 6-month follow-up. Those who did not complete a 3-month assessment ($n = 11$) were compared to successfully followed cases ($n = 116$) on baseline demographic and clinical variables. There were no significant differences detected ($ps > .07$). However, there were differences between completers and non-completers of the 6-month follow-up. Those not completing the 6-month assessment ($n = 13$) were younger ($M = 16.0$, $SD = 1.4$) than completers

($M = 16.7$, $SD = 1.2$, $p = .04$), and non-Whites were less likely to complete than Whites ($\chi^2 = 7.85$, $p = .005$). There were no further differences between 6-month follow-up completers and non-completers on the other demographic and clinical variables examined ($ps > .21$).

The final sample was 75.6% male, 86.6% White, and 16.7 years old ($SD = 1.2$) at the time of study entry. At baseline, most participants were living at home with at least one parent (93.7%), enrolled in school (75.6%), unemployed (56.8%), and justice system involved (50.4%). Main reasons for entering the current treatment program were because their parent(s) wanted them to (42.5%), court/probation officer required it (26.8%), or a treatment provider (e.g., therapist, inpatient facility) recommended it (25.2%). Marijuana was the most commonly reported drug of choice at baseline (70.9%), followed by alcohol (11.8%), heroin/narcotics (11.1%) and cocaine/amphetamines (3.2%). The vast majority (93.7%) met lifetime DSM-IV criteria for an SUD; 26.8% met criteria for marijuana abuse (without dependence), 57.5% for marijuana dependence, 27.6% for alcohol abuse (without dependence), 31.5% for alcohol dependence, 2.4% for opiate abuse (without dependence), and 11.0% for opiate dependence. Approximately 61% of the sample met DSM-IV criteria for at least one past-year Axis I condition other than SUD, with the most common being conduct disorder (41.3%), major depressive episode (18.9%), obsessive compulsive disorder (18.9%), oppositional defiant disorder (18.3%), and ADHD (11.0%).

2.2. Treatment Facility, Theoretical Orientation, and National Representativeness

Participants were recruited from a private, for-profit SUD treatment facility that offers adolescent-specific group, individual, and family treatment; medication (including a buprenorphine/naloxone program); and parent group and individual treatment. Adolescent treatment includes an intake assessment and attendance at 12 weekly, 60-minute group treatment sessions, followed by a formal reassessment. Ninety percent of those who completed an intake interview attend at least one group. In the current sample, the mean number of sessions attended was 11.5 ($SD = 6.2$; Median = 11; range 0-44). One patient attended no sessions and three patients attended more than 26 sessions.

Treatment is abstinence-focused and based on a combination of CBT, MET, and 12-step models. The facility offers an aftercare program, referral and linkage of clients to community-based 12-step meetings, as well as referral of clients to other community-based resources following treatment. The treatment facility utilized in the present study is highly representative of currently available community adolescent outpatient treatment (Knudsen et al., 2008). One clinical director also completed the Drug and Alcohol Program Treatment Inventory (DAPTI; Swindle, Peterson, Paradise, & Moos, 1995), an 80-item survey designed to assess the goals and activities of SUD programs across eight theoretical orientations. The director rated the degree to which specific therapeutic goals/activities were similar to the program's therapeutic goals/activities on a 4-point Likert scale ranging from 0 (none or very little/not at all like our program) to 3 (primary focus of treatment/major feature of our program). The program scored the highest on Cognitive-Behavioral orientation (17/24), and the lowest on 12-Step orientation (1/24). However, staff reported high rates of referral to 12-step meetings (88% of patients).

2.3. Measures

Prior Treatment—At treatment intake, participants were asked about their prior history of SUD treatment, including inpatient/residential programs (whether or not they had been in an inpatient or residential program), outpatient programs (total length in weeks), and individual sessions with a mental health professional (number of sessions). These data were collected using the Background Information Form (Brown et al., 1989).

Past 90-day Substance Use/Severity and Treatment—At all timepoints, the Timeline Follow-Back (TLFB; Sobell and Sobell, 1992) and Form-90 (Miller and Del Boca, 1994) were used in conjunction to examine substance use and treatment experiences in the past 90 days. Participants used a calendar to record their past 90-day treatment experiences (i.e., outpatient substance use treatment sessions, length of any inpatient substance use program, individual therapy and/or sessions with a psychiatrist [for either substance use or mental health issues], and AA/NA attendance). Participants also used the calendar to assist with estimates of substance use frequency and timing. From these measures, percent days abstinent (PDA) was calculated by dividing the number of days of no alcohol/drug use (excluding nicotine) by the total number of days in the time period and multiplying by 100. The amount of treatment received was calculated for the 90 days prior to treatment, baseline to 3-month follow-up, and 3- to 6-month follow-up. Substance use severity was measured using the Personal Involvement Scale (PIS) taken from the Personal Experiences Inventory (PEI; Winters et al., 1996). Internal consistency in the current sample was high (Cronbach's $\alpha = .94$). Substance-related consequences were measured using the InDUC-2R (Tonigan and Miller, 2002). Internal consistency for the total score used in the current sample and study was high for this measure as well (Cronbach's $\alpha = .96$).

12-Step Expectancies—At baseline, 12-step expectancies were measured using the Twelve-Step Participation Expectancies Questionnaire (T-SPEQ; Kahler et al., 2006). This 39-item self-report instrument assesses attitudes about the potential positive (e.g., social support, increased motivation) and negative (e.g., social and spirituality concerns) aspects of AA/NA attendance, with higher scores indicating more positive expectancies about AA/NA participation. We used the total scale score in this study which demonstrated high internal consistency in the present sample (Cronbach's $\alpha = .91$).

Treatment Staff 12-Step Encouragement—At 3-month follow-up, participants were asked to rate how strongly treatment staff (at the outpatient treatment program) encouraged them to go to AA and NA on a scale of 1 (*not at all*) to 10 (*very much so*). This rating served as a patient-level proxy for the degree of 12-step facilitation received in the first three months of outpatient treatment.

Parent 12-Step Perceptions—Parents of participants completed a brief self-report questionnaire regarding their opinions about their adolescent's participation in AA/NA. Parents rated AA/NA's degree of helpfulness, importance, and safety for their adolescent on a 1 (*not at all*) to 10 (*very*) scale.

Abstinence Goal—At baseline, participants were asked to verbally state their goals separately for future alcohol use and future drug use. Responses were recorded verbatim and categorized as either (a) continued use permissible/desirable (coded 0) or (b) complete abstinence (coded 1), for alcohol and drugs separately.

Abstinence Self-Efficacy—At baseline, participants were asked to separately rate the likelihood that they would stop drinking alcohol or stop using drugs in the next 90 days on a 10-point scale ranging from 1 (*definitely won't stop*) to 10 (*stop for sure*).

Biological Verification of Self-Report—Biological verification of self-reported abstinence was conducted using Intercept Oral Fluid Drug Test kits, which test saliva for the presence of seven substances (amphetamines, methamphetamines/MDMA, benzodiazepines, cannabinoids, cocaine, opiates, and phencyclidine) using an Oral 7 Panel screen. Saliva samples were analyzed independently at Kroll Laboratory Specialists, Inc. At follow-up assessments, if youth reported abstinence from substances (excluding alcohol and nicotine) in

the past three months, they were asked to provide a saliva sample. At 3-month follow-up, 89.2% reported at least some drug use and were not tested; 2.5% were not tested because the interview was conducted over the phone, and the remaining 8.3% had negative results confirming a report of abstinence. At 6-month follow-up, 86.0% reported drug use and were not tested, 5.3% were not tested because the interview was conducted over the phone, and the remaining 7.9% had negative results confirming their report of abstinence. Only 0.9% (one instance) had a positive result inconsistent with a self-report of abstinence.

2.4. Procedure

Eligible patients and their parents (when appropriate) were informed about the possibility of study participation by one of two clinical program directors with whom they completed their treatment intake assessment. If the patient and/or their parents agreed to be contacted by study staff, program directors provided study staff with the name and phone number of the eligible patient. Study staff then attempted to contact interested patients. If contact was made, study staff briefly screened for eligibility, discussed study procedures and confidentiality, answered questions, and scheduled a baseline appointment.

Participants completed the baseline assessment as close as possible to their treatment start date, (M days = 10.6, SD = 12.4) followed by a 3-month and 6-month follow-up assessment conducted 90 and 180 days after their treatment start date, respectively. The baseline assessment was completed in 2-3 hours, and the 3- and 6-month follow-ups took 1-2 hours. Participants were paid by check at the end of each assessment: \$50 at baseline and \$40 at both 3- and 6-months. Participants who completed only part of an assessment received partial payment for the portion completed.

Assessments usually took place at the outpatient treatment facility (91%). However, in cases where participants were unable or unwilling to meet at the treatment facility, interviews were completed over the phone (6%) or in-person at the office of the study staff (3%). For those interviews completed over the phone, study staff mailed the self-report questionnaires to participants ahead of time, and participants either mailed the completed questionnaires back in a return envelope that was provided to them or read their answers to the interviewer over the phone during the main assessment phone call. The study protocol was reviewed and approved by the Massachusetts General Hospital/Partners Health Care Institutional Review Board and a federal Certificate of Confidentiality was also obtained through the study's funder, the National Institute of Alcohol Abuse and Alcoholism (NIAAA).

2.5. Data analysis Plan

We first computed descriptive statistics to document the 12-step attendance rates before, during, and after outpatient treatment. We then conducted univariate correlational analyses to test for several potential predictor variables of 12-step attendance, and subsequently tested a predictive model using multiple regression analysis (MRA) with the significant predictors. To examine the relationship of AA/NA participation to substance use outcomes, we first explored a number of potential confounding variables in order to control for them and then computed concurrent and lagged MRA to test for independent effects of AA/NA on outcomes.

The 12-step attendance variable at baseline and 3-month follow-up had an undesirably large skew (3.6 and 3.9, respectively). These variables were linearly transformed using a Log 10 satisfactorily reducing skewness and kurtosis (after adding "1" to eliminate zeros). Analyses were conducted with both transformed and untransformed variables. The differences in magnitude of the relationships for the variables were not large, but differed marginally in statistical significance with some variables. Thus, below we report the transformed variables.

The main outcome variable was PDA. PDA at 3- and 6-month follow-ups was found to possess a normal distribution and was not skewed (-.26 and .14, respectively).

3. Results

3.1 Rates of 12-Step MHG Participation

At the time of treatment entry, less than half of the sample (42.5%) had attended at least one AA/NA meeting in their lifetime. During the 90 days prior to treatment, 27.6% had attended an AA/NA meeting. Among those attending, the average number of meetings attended was 20.1 ($SD = 24.2$), with a median of 8. Of the entire sample, the average number of meetings attended was 5.5 ($SD = 15.5$; Range 0-87). During the first 3 months of follow-up, while patients were undergoing outpatient treatment, 27.7% of the sample attended at least one AA/NA meeting (25% AA, 5.2% NA). Among attendees, the average number of meetings was 17.2 ($SD = 22.2$), with a median of 8. The mean number of AA/NA meetings attended during treatment in the entire sample was 4.8 ($SD = 14.0$; Range 0-90) (AA mean = 3.41 (10.7); NA mean = 1.15 (8.6)). Between 4 and 6 months following treatment, 23.7% of the sample attended at least one AA/NA meeting. Among attendees, the average number of meetings was 23.5 ($SD = 20.8$), with a median of 24. The mean number of meetings attended following treatment in the sample was 5.6 ($SD = 14.2$; Range 0-90).

3.2. Correlates of 12-step Mutual-Help Group Participation

We examined a number of potential correlates of 12-step MHG participation shown in Figure 1. Pretreatment variables examined were: (a) demographics (age, gender, ethnicity), (b) percent days abstinent (90 days before treatment entry), (c) prior treatment (inpatient, outpatient, individual professional therapy sessions), (d) substance use severity (substance involvement/consequences), and (e) prior 12-step attendance (90 days before treatment entry). Intake variables were 12-step expectancies, drug treatment goal (abstinence vs. continued use), drug abstinence self-efficacy, whether the patient perceived a problem with alcohol or drugs, and parents' reports of their perceptions about AA/NA participation for their child. The only during-treatment variable was the degree of treatment staff encouragement to attend 12-step groups.

Table 1 reports the magnitude of the significant correlates of 12-step attendance, and Figure 1 shows which variables were correlates of 12-step attendance. Age and gender ($ps > .07$) were not related to 12-step attendance. However, compared to non-Whites, Whites were significantly more likely to attend 12-step meetings in the 90 days prior to treatment ($\rho = .20$, $p = .03$) and at 3-month follow-up ($\rho = .19$, $p = .04$). In addition, PDA prior to treatment entry was associated with more 12-step attendance at follow-up ($\rho = .48$, $p < .01$), as were more prior inpatient ($\rho = .40$, $p < .01$), outpatient ($\rho = .43$, $p < .01$), individual professional therapy sessions ($\rho = .19$, $p = .04$), and greater substance use involvement ($\rho = .22$, $p = .02$), but not greater substance use consequences ($p = .08$). However, substance use involvement and consequences were strongly correlated with each other ($\rho = .59$, $p < .01$). More positive 12-step expectancies ($\rho = .22$, $p < .05$), a perceived problem with drugs ($\rho = .19$, $p < .05$), drug abstinence goal ($\rho = .32$, $p < .01$), and drug abstinence self-efficacy ($\rho = .21$, $p < .05$) were all significantly related to greater 12-step attendance. However, parents' reports of their perceptions about AA/NA participation for their child were not related to 12-step attendance ($ps > .27$). Lastly, the degree of treatment staff encouragement to attend 12-step groups ($\rho = .33$, $p < .01$) was related to greater 12-step attendance.

These twelve significant variables were then entered into a simultaneous regression model. This model overall accounted for 53.6% of the variance in 12-step attendance during the first 3 months ($F = 9.13$, $p < .001$, Adjusted $R^2 = .48$). Prior AA/NA attendance, the number of SUD treatment sessions received during the 90 days prior to treatment, and prior outpatient

treatment, all made significant independent contributions in the prediction of AA/NA attendance (see Table 2).

3.3. Relationship between 12-Step MHG Participation and Percent Days Abstinent

We sought to test whether participation in AA/NA during outpatient treatment would result in better outcomes both during treatment (months 0-3) and in the subsequent 3 months after completing treatment (months 4-6). To test this, we first explored a number of variables that might need to be controlled in order to remove possible confounds and enhance causal inferences between 12-step attendance and substance use outcome. We examined three sets of control variables to assess whether they were related to PDA: (a) pre-treatment variables (prior inpatient/outpatient/professional therapy treatments, prior AA/NA attendance, baseline PDA, substance use involvement and consequences), (b) intake variables (abstinence goal, perceived alcohol/drug problem, abstinence self-efficacy), and (c) treatment variables (number of concurrent outpatient treatment sessions [intensity] and outpatient attendance in weeks [duration]). Table 3 reports the significant correlates of PDA at the 3- and 6-month follow-ups.

Significant variables were entered into a two-step hierarchical regression model. In the first step, we entered the significant univariate predictors: baseline PDA, prior outpatient treatment, prior inpatient treatment, prior AA/NA participation, drug abstinence goal, and drug abstinence self-efficacy. We also entered concurrent outpatient treatment session attendance to control for this. This was followed in the second step by AA/NA participation. AA/NA participation was significantly and independently related to PDA both concurrently (0-3m; $t = 2.4, p = .020$) and when predicting subsequent PDA (4-6m; $t = 2.0, p = .049$) in the lagged model, after controlling for these confounds (see Tables 4a and 4b). The model overall accounted for 47% of the variance in PDA at 3-months ($F = 8.78, p < .001$, Adjusted $R^2 = .41$) and 27% of the variance in PDA at 6-month follow-up ($F = 3.52, p = .001$, Adjusted $R^2 = .20$). AA/NA participation independently explained a further 3.0% and 3.1% of the variance at 3- and 6-months, respectively (R^2 change = .030, $p = .020$; R^2 change = .031, $p = .049$). Re-running this model with the untransformed 12-step variable, this effect translated into a “real world” recovery metric of an additional half a day of abstinence for every AA/NA meeting attended, over and above all other factors associated with positive outcome. Also, at 3-month follow-up, baseline PDA, prior AA/NA participation, drug abstinence goal, drug abstinence self-efficacy, and the number of outpatient sessions attended all made additional significant independent contributions to the model (see Table 4a). Similarly, baseline PDA, prior AA/NA participation, and the number of outpatient sessions attended made significant independent contributions to the lagged model predicting subsequent PDA during 6-month follow-up (see Table 4b).

We categorized the AA/NA participation variable at the 3-month follow up into those not attending ($n = 86$), those who attended less than once per week ($n = 20$), and those attending more than once per week ($n = 13$). Figure 2 shows the relationship between these rates of attendance and PDA. A one-way ANOVA revealed a significant main effect for AA/NA group participation ($F = 6.77, p = .002$). Post-hoc tests using Tukeys HSD revealed those attending more than once per week had significantly higher PDA than the other two groups ($p = .001$). The difference between less frequent AA/NA attendees and those with no attendance with regard to PDA approached significance ($p = .06$).

4. Discussion

This study found that a substantial minority of outpatient youth participated in 12-step MHGs during and following outpatient treatment. Rates of participation were lower than in previous studies of inpatient youth (e.g., Kelly et al., 2008a), but were very similar to those reported in another study of outpatient youth (Chi et al., 2007). In keeping with previous findings with both young people and adults, AA/NA participation was more likely among those patients with

greater substance use severity, more extensive prior treatment experiences, and a goal of abstinence from drugs. Analyses controlling for concurrent outpatient treatment participation and a host of other confounds, showed that AA/NA attendance significantly and independently predicted PDA, suggesting that AA/NA participation may potentiate and extend the benefits of typical community outpatient SUD treatment.

Rates of AA/NA attendance may have been lower among these outpatient youth either because they did not see an intrinsic need to attend, or because the treatment program was based mostly on CBT principles and did not employ 12-step concepts within the professionally-delivered outpatient treatment. The AA/NA participation rate in this study is very similar in magnitude to that reported in an outpatient adolescent study by Chi and colleagues (2007). Neither of the treatment programs in these two studies appeared to systematically apply TSF strategies. Among adult samples, studies of TSF and 12-step treatments clearly demonstrate that professional emphasis on 12-step concepts and systematic referral to AA/NA resources following treatment can make a clinically meaningful difference in patients' attendance and improve patients' treatment outcomes (Kaskutas, 2009; Kelly and Yeterian, in press; Kelly and Moos, 2003). However, there have been no randomized controlled trials of TSF among young samples. Such studies are sorely needed to demonstrate the relative efficacy of such interventions for youth.

We examined an array of demographic, clinical, psychosocial, and 12-step-specific predictors of 12-step attendance at individual and contextual levels. We found that the variables with the largest influence on AA/NA attendance were the different types of prior SUD treatment. This may be because these variables are a proxy for a higher degree of addiction severity, and perhaps reflect a greater perceived need to seek help. It may also signify the influence of prior treatments that more heavily emphasized 12-step group participation, or perhaps a combination of these. The seemingly contradictory finding that both greater PDA and greater addiction problem severity predicted AA/NA attendance may be reflective of these greater prior treatment experiences that potentially facilitated greater abstinence and was also indicative of greater global substance involvement. Of note, staff encouragement was associated with greater 12-step attendance, but adolescents' participation was unrelated to their parents' thoughts about AA/NA. Although, these measures differ in their degree of direct encouragement to attend AA/NA, the stronger influence of professional encouragement than parent attitudes may mean that clinicians have an important TSF role to play in treatment. This might also entail indirect TSF by helping parents to more proactively facilitate their child's attendance.

Importantly, AA/NA attendance was associated with an independent beneficial effect on substance use outcome both during and following outpatient treatment. We conducted a rigorous test that accounted for a number of confounds, in order to help rule out alternative explanations for this beneficial effect, including the effect of concurrent outpatient treatment session attendance. These findings provide empirical support for the potential of community AA/NA groups to enhance treatment effects among adolescents. More specifically, our results indicate that AA/NA groups may serve a particularly important role for the more severe adolescent outpatients for whom standard outpatient treatment intensity may be insufficient.

Regarding dose-response effects, we found that attending AA/NA at least once per week, on average, was associated with the most marked improvements in outcomes, but that attending less frequently was marginally associated with improvement. These findings are similar to the exploratory analyses conducted among inpatient samples that found benefits for even small amounts of attendance, with three meetings per week associated with complete abstinence (Kelly et al., 2008a). Thus, encouraging a minimum of once per week attendance and three or more times per week as optimal, might be prudent clinical recommendations among adolescent samples.

4.1 Limitations

Generalizations made from this study should be tempered by its inherent limitations. First, the study is naturalistic and correlational, and the sample self-selected into AA/NA groups. However, this is the true nature of participation in these groups, and we have tried to rule out alternative explanations for the observed beneficial effects attributable to AA/NA attendance. As mentioned above, controlled trials of TSF are needed among young people to help determine the efficacy of professionally-led interventions to increase involvement in these peer-led recovery resources. Second, although our measure of AA/NA attendance was predictive of better outcomes, we did not evaluate other indices of involvement (e.g., having a sponsor, working the 12 steps) that in some adult studies have been shown to be more potent predictors of outcome. Most studies of young people have examined attendance only and this study can easily be compared to these. Third, although follow-up rates were very high, there were some systematic differences between completers and non-completers of the 6-month follow up, such that younger adolescents and non-Whites were less likely to be followed-up. In exploratory analyses, it was revealed that non-Whites were significantly younger and were less likely to have a goal of complete abstinence, as compared to Whites. Given the small number of non-Whites in the sample, and the even smaller number of non-Whites not completing the 6-month interview ($n = 5$), it is difficult to draw firm conclusions as to the reason for the disproportionately high rate of non-participation at 6-months, but this should be monitored in future studies. Finally, we chose to focus on the short-term influence of AA/NA participation. While the first six months after treatment initiation is likely to be one of the most demanding, in terms of recovery adjustment and relapse risk (Hunt, 1971; Brown et al., 1993). Longer-term studies are needed to determine the benefits of outpatient treatment among young people and the role AA/NA may play in the relapse-recovery trajectories as adolescents transition to young adulthood.

4.2. Conclusions

Despite greater potential barriers facing young people, AA/NA attendance appears to potentiate and extend the benefits of typical community outpatient treatment. Consequently, the widespread availability of these recovery resources may provide a highly cost-effective resource for young people, especially for those who are the most substance-involved and who are seeking recovery. Importantly, at this stage of the lifespan, rates of alcohol and drug use are rising dramatically among same-aged peers in the population, resulting in a scarcity of recovery-specific support for youth (Substance Abuse and Mental Health Services Administration, 2008). AA/NA groups may provide a concentrated social recovery resource for young people during the high-risk transition to young adulthood (Kelly et al., 2008a). Clinicians might encourage adolescents to attend at least once a week. Such encouragement is effective and that level of attendance has been associated with significantly better outcomes (Kelly et al., 2008a). Placed in context with prior findings, it is probable such benefits might be enhanced further by actively linking young people to meetings where at least some other young people may be present (e.g., Young People's AA/NA meetings), garnering parents' emotional and instrumental support for their child's participation, helping educate youth about what to expect at meetings, and professionally monitoring adolescents' reactions and experiences during treatment to help overcome participation obstacles.

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Figure 1.
 Correlates of 12-step attendance among adolescent outpatients model

Figure 2.
Relationship between 12-step attendance and PDA at 3-month follow-up.

Table 1

Correlates of 12-Step Attendance at the 3-month follow-up

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Ethnicity	.87	.34	-												
2. PDA at intake	45.19	34.29	.11	-											
3. Prior inpatient Tx	.28	.45	.15	.38**	-										
4. Prior outpatient Tx	2.50	6.57	.04	.24**	.33**	-									
5. Prior professional sessions	11.20	35.59	.24**	.06	.20*	.14	-								
6. 12-step attendance (0m) ^a	.29	.54	.20*	.47**	.59**	.36**	.12	-							
7. PIS score	52.52	17.54	.08	-.10	.34**	.21*	.18*	.13	-						
8. 12-step expectancies	3.05	.87	.17	.12	.28**	.12	.20*	.39**	.16	-					
9. Perceived drug problem	.43	.50	.10	-.04	.41**	.18*	.13	.27**	.37**	.24**	-				
10. Abstinence goal	.26	.44	.18*	.24**	.30**	.20*	.08	.29**	.15	.34**	.21*	-			
11. Abstinence self-efficacy	5.57	3.48	.05	.30**	.11	.26**	.10	.22*	.01	.26**	.03	.36**	-		
12. Tx staff AA/NA attendance encouragement	2.96	2.27	.26**	.14	.33*	.19*	.09	.39**	.12	.20*	.34**	.20*	.18	-	
13. 12-step attendance (3m) ^a	.27	.51	.19*	.26**	.43**	.40**	.19*	.48**	.22*	.25**	.24**	.32**	.29**	.33**	-

Ethnicity = 0 (Other) and 1 (White); PDA = Percent days abstinent from any substance during past 90 days; 12-step attendance = past 90 days; a = Log10 transformed; Perceived problem with drugs = 0 (No) and 1 (Yes) Goals = 0 (Abstinence) to 1 (Continued use); Self-efficacy = 10 (Very likely to not use)

*
p < .05

**
p < .01

Table 2

Multiple Regression Analysis of significant univariate predictors of 12-step attendance at 3m

Predictors	b	SE	t	p
Pre-Tx Variables				
Ethnicity	.04	.11	.35	.73
PDA	.00	.00	.88	.38
Prior inpatient treatment	-.10	.12	-.87	.39
Prior outpatient treatment *	.02	.01	3.87	.00
Prior professional sessions *	.00	.00	2.43	.02
12-step attendance (0m) ^a *	.53	.10	5.55	.00
Problem severity (PIS score)	.00	.00	.68	.50
Intake Variables				
12-step expectancies	.03	.05	.66	.51
Perceived drug problem	-.08	.09	-.96	.34
Drug abstinence goal	.12	.10	1.23	.22
Drug abstinence self-efficacy	.01	.01	.75	.46
Tx staff 12-step encouragement	-.01	.02	-.31	.76

^a a = Log10 transformed. Dependent variable: 12-step attendance (0-3 month)

Table 3
Spearman Rho's Predictors of Percent Days Abstinent at 3- and 6-month follow-up

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Prior Inpatient Tx	.28	.45	-										
2. Prior Outpatient Tx	2.50	6.57	.33**	-									
3. Alcohol abstinence goal	.10	.30	.28**	.16	-								
4. Drug abstinence goal	.26	.44	.30**	.20*	.11	-							
5. Alcohol abstinence self-efficacy	4.72	3.48	.22*	.08	.29**	.24**	-						
6. Drug abstinence self-efficacy	5.57	3.48	.11	.26**	.22*	.36**	.19*	-					
7. 12-step attendance (0m) ^a	.29	.54	.59**	.36**	.25**	.29**	.18	.22*	-				
8. 12-step attendance (3m) ^a	.27	.51	.43**	.40**	.08	.32**	.07	.29**	.48**	-			
9. PDA 0-month	45.19	34.29	.38**	.24**	.24**	.24**	.18*	.30**	.47**	.26**	-		
10. PDA 3-month	53.64	34.70	.19*	.23*	.25**	.47**	.22*	.47**	.22*	.32**	.46**	-	
11. PDA 6-month	47.90	36.96	.22*	.11	.19*	.30**	.12	.32**	.18	.29**	.36**	.68**	-

PDA = Percent days abstinent from any substance; 12-step attendance = past 90 days; a = Log10 transformed; Goals = 0 (Abstinence) to 1 (Continued use); Importance/Likelihood = 1 (Not important/likely) to 10 (Very important/likely)

* $p < .05$

** $p < .01$

Table 4**a. Multiple Regression Analysis testing the independent effect of 3-month 12-step attendance on 3-month substance use outcomes**

Predictors	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Pre-Tx Variables				
PDA at intake	.42	.09	4.47	.00
Prior inpatient treatment	-1.83	7.20	-.25	.80
Prior outpatient treatment	.14	.40	.34	.74
Prior 12-step attendance	-15.15	7.04	-2.15	.03
Intake Variables				
Alcohol abstinence goal	-2.44	9.95	-.25	.81
Drug abstinence goal	16.28	6.74	2.41	.02
Alcohol abstinence self-efficacy	.58	.86	.68	.50
Drug abstinence self-efficacy	2.34	8.2	2.84	.01
Concurrent treatment sessions	.98	.46	2.16	.03
Treatment Variables				
12-step attendance (3 month) ^a	15.18	6.41	2.37	.02

b. Lagged Multiple Regression Analysis testing the independent effect of 3-month 12-step attendance on 6-month substance use outcomes

Predictors	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Pre-Tx Variables				
PDA at intake	.31	.12	2.59	.01
Prior inpatient treatment	12.29	9.44	1.30	.20
Prior outpatient treatment	-.10	.51	-.20	.84
Prior 12-step attendance	-19.84	9.07	-2.19	.03
Intake Variables				
Alcohol abstinence goal	-.96	12.64	-.08	.94
Drug abstinence goal	6.86	8.80	.78	.44
Alcohol abstinence self-efficacy	.04	1.11	.04	.97
Drug abstinence self-efficacy	1.59	1.06	1.50	.14
Concurrent treatment sessions	1.47	.60	2.45	.02
Treatment Variables				
12-step attendance (3 month) ^a	16.42	8.22	2.00	.04

^a = Log10 transformed. Dependent variable: Percent days abstinent (PDA) at 3-month follow-up

^a = Log10 transformed. Dependent variable: Percent days abstinent (PDA) at 6-month follow-up